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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/594,537      | 09/27/2006  | Ho-Seong Nam         | 5038-062725         | 3363             |

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| EXAMINER |
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GEORGE, PATRICIA ANN

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| ART UNIT | PAPER NUMBER |
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1792

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03/31/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                       |                                   |  |
|------------------------------|---------------------------------------|-----------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/594,537  | <b>Applicant(s)</b><br>NAM ET AL. |  |
|                              | <b>Examiner</b><br>Patricia A. George | <b>Art Unit</b><br>1792           |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 26 October 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/26/2007</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-8, and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akahori et al (6,783,434).

As to claim 1, Akahori teaches a CMP abrasive solution for methods of improved selective removal rate (see col. lines 30-39) for forming a shallow trench (i.e. shallow trench isolation – see Technical Field) that includes (in col. 2, lines 40-44): a cerium abrasive (i.e. polishing particles – as in claim 4), a polymer dispersant (i.e. polishing particle dispersant), and de-ionized water (see preparation). Akahori also teaches the use of a liquid additive solution that contains a dispersant and water which is selective relative to the polishing rate ratio (i.e. for increasing the removal selectivity – see col. 5, lines 60-65); the cerium slurry (i.e. the abrasive solution) mixed in equal parts with the liquid additive, which is encompassed by applicants' claimed range of 100 parts by weight of said aqueous abrasive solution is mixed with 50 to 300 parts by weight of said aqueous additive solution. See Table 1.

Akahori fails to teach an explicit example that includes each and every component as applicants' limitations in claim 1, specifically the explicit recitation of water being de-ionized.

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to modify the CMP slurry, as Akahori, to include an example using all of applicants' specifically claimed components, because Akahori teaches use of each and every component is effective, and use of components known as effective are cost saving.

As to claim 2, Akahori teaches the cerium slurry (i.e. aqueous abrasive solution) is comprised of 100 parts cerium particles to 0.001 to 2000 parts dispersant, which appears to be encompassed by applicants' claim of 0.01 to 30 weight % of said polishing particles. See col. 6, lines 16-24. Akahori teaches the dispersant may be a surfactant (see col. 4, lines 7-14), in quantities of 0.01 to 2 wt %, in the cerium slurry. See col.5, line 25-27.

As to claim 3, Akahori teaches the aqueous additive (i.e. aqueous additive solution) is comprised of: 1 to 10 wt% of a polyammonium-acrylate or a polyamine-acrylate, which overlaps and encompasses applicants' claimed range of 0.001 to 5 weight % of a poly(meth)acrylic acid polymer; 10 mol % or less of free ammonia or a free amine, which appears to be close to and encompassed by applicants' claimed range of 0.001 to 3 weight % of an amine-group compound (see col.14, lines 6-13); and ammonium salts in quantity of 1 to 100 mol % (see col. 4, lines 15-32) which

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appears to be close to and encompassed by applicants claimed range of 0.001 to 4 weight % of a nitrogen-containing organic cyclic compound.

As to claim 5, Akahori teaches the polishing particles have a size of 0.01 to about 1 micron, which is encompassed by applicants' claimed range of 0.002 to 10 micrometers. See col. 5, lines 50-53.

As to claims 6 and 8, Akahori teaches the surfactant is one or more compounds selected from the group consisting of a polyacrylic acid ammonium salt, polymethacrylic acid ammonium salt (see Preparation 3), polyacrylic acid amine salt (see col. 5, lines 1-15), polymethacrylic acid amine salt, poly(ethylene-co-acrylic acid) ammonium salt, poly(ethylene-co-acrylic acid) amine salt, poly(ethylene-co-methacrylic acid) ammonium salt, and poly(ethylene-co-methacrylic acid) amine salt. See col. 4, lines 52-64.

As to claim 7, Akahori teaches the dispersant that is a surfactant has a molecular weight of 100 to 100,000, which overlaps and encompassed applicants' claimed range of 1,000 to 1,250,000. See col. 5, lines 28-37.

As for claim 11, Akahori teaches the abrasives are 0.3 - 40%, the dispersant 1 - 2%, which leaves the remainder water 58-98.7%, which appears to encompass applicants claimed up to 500 parts by weight of said de-ionized water. See col. 10, lines 48-54.

As for claim 12, Akahori teaches the pH of the slurry is about 6.0 to 10, which encompasses and overlaps applicants' claimed range See col. 13, lines 1-2; adjustment of pH may be performed by adding an acid or an alkali, such as acetic acid or aqueous ammonia, to the liquid additive. See col.6, line 26-42.

Akahori fails to applicants' specifically claimed units, such as parts by weight.

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to modify the invention of polishing slurry, as Akahori, to include any unit equivalent, as in applicants' claimed limitations, because equivalents appear to encompass a similar quantity.

***Claim Rejections - 35 USC § 103***

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akahori et al (6,783,434), as applied to claims 2-8, and 11 above, further in view of Motonari (6,447,695).

As to claim 9, Akahori fails to teach applicants' specifically claimed nitrogen-containing organic cyclic compounds.

Motonari teaches it is known to use a component for adjusting the polishing rate, which is a derivative of a heterocyclic compound with an amino group, such as compounds of diazine, triazine and the like: 2,4-diamino-6-diallylamino-1,3,5-triazine (i.e. 1,3,5-triazine group); thiocyanuric acid (i.e. cyanuric acid); and melamine. (See col. 5, line 35 – col. 6, line 10.)

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to modify the invention of polishing slurry, as Akahori, to include applicants' specifically claimed nitrogen-containing organic cyclic compounds for an aqueous cmp slurry, because Motonari teaches such components are known to be

effective as polishing rate adjusters, and use of components known effective are cost saving.

***Claim Rejections - 35 USC § 103***

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akahori et al (6,783,434), as applied to claims 2-8, and 11 above, further in view of Tsai (6,174,454).

As for claim 10, Akahori fails to teach applicants' specifically claimed amine-group compound.

Tsai teaches improved polishing selectivity is achieved by adding various amount of tetra-alkyl in ammonium hydroxide (see abstract) and TMAH (i.e. tetra-methyl-ammonium hydroxide) (see Embodiment B) in CMP polishing slurry.

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to modify the invention of polishing slurry, as Akahori, to include applicants' specifically claimed amine group compounds for an aqueous cmp slurry, because Tsai teaches such components provide benefits by improving selectivity, and use of components known to provide an improvement is cost saving.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patricia A. George whose telephone number is (571)

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272-5955. The examiner can normally be reached on Mon. - Fri. between 8:00 am and 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Duy-Vu N Deo/  
Primary Examiner, Art Unit 1792

/Patricia A George/  
Examiner, Art Unit 1792